

Status of the endangered Spotted Ground Thrush *Zoothera guttata fischeri* in coastal Kenya forests

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Spotted Ground Thrush *Zoothera guttata* is a rare, elusive and little-known bird species with a wide but discontinuous distribution. Severe threats in form of forest loss and fragmentation leading to rapid population decline have led to the species being classified as Endangered (BirdLife International 2000, 2007). Five races of the bird have been described, all existing in isolated patches of moist evergreen forest (Fry *et al.* 1997). Two are migratory and coastal, one (*Z. g. fischeri*) in Kenya, Tanzania, and probably Mozambique, and the other (*Z. g. guttata*) in South Africa. A resident race (*belcheri*) is found in Malawi, and two other races are known from single specimens in Sudan (*maxis*) and Democratic Republic of Congo (*lippensi*).

Z. g. fischeri is known only as a non-breeding visitor between late March and November to forests on the Kenya coast (Bennun 1992). Their breeding grounds were unknown for a long time until in the 1990s when birds with brood patches were caught in the forest on the Rondo Plateau in southern Tanzania (Holsten *et al.* 1991). There may be other breeding populations in Mozambique (Baker & Baker 1992). Past studies done in Kenya showed that their preferred habitat seemed to be a few tiny patches of thick coastal forests on coral rag soils, where they were recorded at high densities (Bennun 1985). However, because the coral rag forest patches are so small, Arabuko-Sokoke has been suspected to hold the bulk of the non-breeding population despite that fact that the species is known to occur at very low densities throughout the forest (Bennun 1992).

Information regarding the Spotted Ground Thrush in most Kenyan sites has been scanty and scattered, making it difficult to clearly understand its status in Kenya. Bennun (1985, 1987) did the only focussed studies on Spotted Ground Thrush in Kenya. In 1983 he did a short study assessing the species' status and general ecology at Gede Ruins forest. This was later followed up by a one-week ringing session in 1985. Further ringing was done at Gede Ruins and Arabuko-Sokoke forests in 1992. These studies suggested that the overall numbers of this species in Gede Ruins did not change between 1983 and 1992 (Bennun 1985, Bennun & Njoroge 1999). Bird surveys done in 1994 in the South Coast forest sites (Waiyaki 1995) also helped in giving an idea of the condition of forest sites where the species could be found at that time.

A long time had passed since these last bird surveys. This necessitated

follow-up surveys of the Spotted Ground Thrush forests at the Kenyan coast to assess the current status of the species and its forest habitat. International and national action plans for the species have been developed (Ndang'ang'a *et al.* 2005, Sande & Ndang'ang'a 2004). Highlighted under the aim of these plans is the need to improve the knowledge on the status of the species.

In this paper, we use the results of a rapid survey, past literature and other existing information to examine the conservation status of *Z. g. fischeri* on its non-breeding grounds in the Kenya coastal forests. We achieve this through re-assessing: (1) its current and probable changes in population, distribution and forest habitat status, and (2) existing conservation measures that benefit the species.

Study Area

Coastal forests in Kenya are generally distributed north and south of Mombasa, and occur as numerous fragments of wide-ranging sizes. The fragments are the remains of a once extensive and continuous, although heterogeneous forest mosaic block that extended from northern Mozambique in the south to southern Somalia in the north. As a result of development pressure, the block was fragmented into numerous forest fragments of a wide range of sizes. The forests are now a heterogeneous group of isolated evergreen or semi-evergreen closed-canopy forests, within 60 km of the Indian Ocean and usually on low hills rising to not more than 600 m (Waiyaki 1995).

The forests face various conservation problems, mostly associated with an increase in human population. These include: clearance for agriculture land and tourism development; removal of timber, poles and fuel wood, unfriendly forestry practices such as logging and replacement of indigenous forest; subsistence hunting; and breakdown of traditional conservation practices. Some of the coastal forests fall on private land. Others are Forest Reserves, either under full jurisdiction of the Forestry Department (FD) or within National Reserves and thus managed under a Memorandum of Understanding between the FD and the Kenya Wildlife Service (KWS). The rest are National Monuments administered by the National Museums of Kenya (NMK) under the National Monuments Act.

The survey was done in 10 Kenyan coastal forests in which Spotted Ground Thrush has been previously reported, or was suspected to be present (Figure 1, Table 1). Records were also provided for two additional sites (Vipingo and Mombasa) from other sources. Shimoni was only quickly assessed for its physical status through a two-hour visit. The three different fragments of Diani forests that were studied occurred under different ownership (Colobus Trust, Banana Farm and Baobab Beach Resort respectively), and were each visited separately. All except five of these forests have been identified as Important Bird Areas (IBAs), and each is described in detail by Bennun & Njoroge (1999).

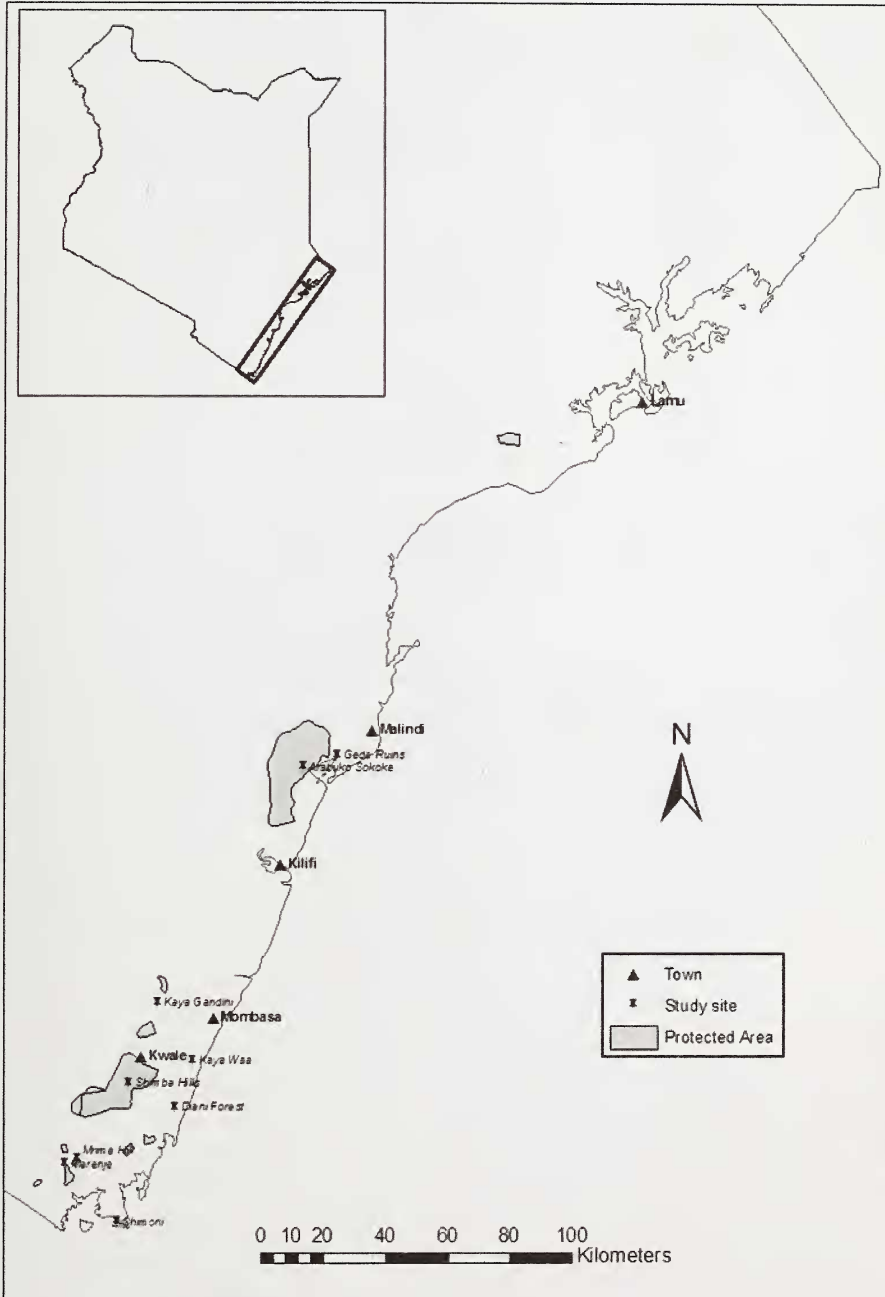


Figure 1: Location of study sites in Kenya

Table 1: Occurrence of Spotted Ground Thrush in surveyed sites

Site	IBA number.	Protection status
Gede Ruins****	KE 011	National monument
Arabuko-Sokoke****	KE 007	Forest Reserve/National Park
Diani****	KE 009	Private (Colobus Trust, Banana Farm and Baobab Beach Resort)
Mrima Hill****	KE 018	Forest Reserve/National monument
Vipingo****	Non-IBA	Private
Kaya Gandini****	KE 012	National monument
Mombasa****	Non-IBA	Private (Tamarind Hotel)
Shimba Hills***	KE 020	National Reserve
Shimoni**	Non-IBA	Private
Kaya Waa**	KE 013	National monument
Marenje *	Non-IBA	Forest Reserve
Kaya Diani*	Non-IBA	National Monument

**** Present: confirmed to be still present in 2003

*** Expected to be still present though not confirmed in 2003

** Known from old records, but unlikely to be present now

* Never been recorded but surveyed during this study

Methods

Surveys were carried out between 16 June and 20 July 2003 within the period when Spotted Ground Thrush is found on the forests of the Kenya coast as a non-breeding visitor. Additional information was collated from an on-going ringing programme at Arabuko-Sokoke forest, as well as from past literature.

In each of the study forests visited (except Shimoni), mist nets were used at sites distributed across the forested area. Choice of site was constrained by the availability of suitable small paths or trails and net lengths used varied. Every site was operated for three or four sessions before nets were moved to another site in the same or different forest. These sessions included one or two morning (06:00 – 11:00) and one or two evening (15:30 – 18:30) sessions. All species caught were aged and various biometrics and moulting details taken; in addition, all Spotted Ground Thrushes were colour-ringed.

Birds were also sought between 06:00 and 11:00 within random plots, each covering a radius of 30 m and beyond. One or two observers approached each of the plots quietly, and spent 10 minutes in the plot searching for all bird species. Movements by observers were minimised and particular emphasis was placed in looking for the Spotted Ground Thrush on the leaf litter all around the plot. Birds were detected by sight, call or listening to movements. The type of detection (whether by sight or by hearing) during bird searches was recorded for three other ground feeders in the forests: Red-capped Robin-chat *Cossypha natalensis*, Eastern Bearded Scrub Robin *Cercotrichas quadrivirgata* and Red-tailed Ant Thrush *Neocossyphus rufus*. Since Spotted Ground Thrush was not detected by hearing its call, the increased probability of detecting

other ground feeders from their calls was used to correct the crude density estimate for the Spotted Ground Thrush. Some plot counts ($n = 20$) done at Gede Ruins were combined with an initial 10-minute play back of song recordings of the race *Z. g. guttata* (from *Southern African Bird Sounds* by Guy Gibbon) in an attempt to attract Spotted Ground Thrush.

Observers also did targeted birding by walking around the forest making specific searches for the Spotted Ground Thrush, especially at places with habitat features that the bird are more likely to select, i.e. with areas of closed canopy providing deep shade, thick leaf litter and scant or patchy low vegetation (Bennun 1985). This was combined with the help of a knowledgeable local bird guide who was very familiar with the species.

To assess habitat preference, some habitat parameters were measured within most of the 30-m radius sample plots, and similar plots located at points where Spotted Ground Thrush was caught or seen randomly. The following habitat variables were assessed: slope estimated on a 0-3 scale; litter depth to the nearest 1 cm; percentage grass or herbal cover at the ground (0 - 1 m height), shrubs (plants 1 - 3 m in height), low trees (woody plants 3 - 8 m in height), high trees (woody plants >8 m in height), and entire canopy cover (portion covered by canopy of all woody plants >3 m in height) - all estimated from all the four compass directions; canopy height to the nearest 1 m; number of all cut stems; presence or absence of footpaths within the plot; relative horizontal density of low vegetation estimated based on the distance at which half of 10 x 10 cm black and white squares on a 50 x 50 cm chequered board could cease to be seen as the bearer of the board moved from the observer; and the occurrence of undergrowth tangle estimated on a 0-3 scale.

Results and discussion

Distribution

During the survey, Spotted Ground Thrush was only recorded in five of the 10 forests sites. These were: Gede Ruins, Arabuko-Sokoke (in the mixed forest near Gede), Diani (in Banana Farm), Mrima Hill, and Kaya Gandini (Table 1). Other records were also made in 2003 outside our survey period. On 3 June 2003 a ringed individual from southern Tanzania was found dead on the compound of Tamarind Hotel, Mombasa (Jackson 2004). Later in October 2003, after our study period, Norbert Rotcher (*pers. comm.*) also recorded Spotted Ground Thrush in a small privately owned forest patch in Vipingo, between Mombasa and Malindi. This suggests that relic and little-known patches of coral rag coastal forests within its range are still quite important for the species since it can use them as feeding grounds or for cover. In fact, records of birds had also been made in thickets at Bamburi near Mombasa (Britton & Rathbun 1978), suggesting that even non-forest habitats that provide adequate cover are important for this migratory thrush, and thus should be maintained.

In comparison, during birds surveys conducted between 1992 and 1994

in the south coast forests, Spotted Ground Thrush had been recorded in two more localities (Shimba Hills and Kaya Waa), but had similarly been missed in Marenje and Kaya Diani forests (Waiyaki & Bennun 2000). We did not survey Shimba Hills, and thus cannot rule out the possibility of existence of this species there. Compared to the situation in 1994 (Waiyaki & Bennun 2000), there was a notable decline in forest area (*c.* 80% loss by 2003) and quality at Kaya Waa due to human disturbance, with only *c.* 3 ha of good indigenous forest being left currently. It is thus probable that Spotted Ground Thrush now avoids this forest. Although we did not intensively search for the bird in Shimoni, it is probable that it has disappeared from the site due to habitat loss. We found the forest to have been subdivided among private developers and heavily cut down when we visited it, reducing the chances of survival for the species.

Our records were made at localities spread throughout most of the Kenya coast within the range of the species, suggesting that at a large scale its distribution may not have changed significantly. The occurrence of the species is unknown for dispersed localities such as Lamu and Kipini from where old records dating between 1870 and 1940 had been reported (Britton & Rathbun 1978). Access of coastal forests north of Malindi by birdwatchers and researchers has been limited by insecurity, and the lack of recent records from these sites could merely be due to the lack of opportunistic data. Further focussed surveys of the species in these forests are needed.

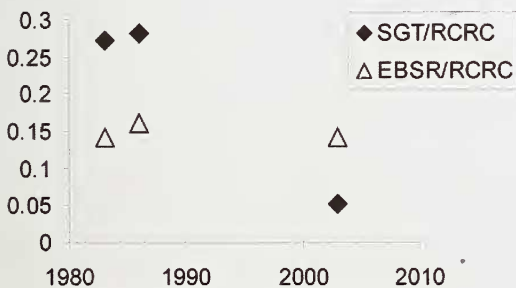
Population status

Of 329 plot counts carried out during the survey, Spotted Ground Thrush was observed only five times. Of these, one was in the Arabuko-Sokoke mixed forest, one in Diani (Banana Farm), two in Mrima Hill and one in Kaya Gandini. A further two observations were made from the targeted birding done in Arabuko-Sokoke Forest though one was seen near the same location as the plot count observation. Out of 516 birds mist-netted, only two were Spotted Ground Thrush. These were caught at Gede Ruins and Diani Forests (Banana Farm fragment) respectively. Both were sub-adults as indicated by some retained juvenile plumage, notably greater and median coverts, remiges and rectrices. Between 2001 and 2002, 11 ringing sessions were carried out within the non-breeding months of the species at a site within the mixed forest of Arabuko-Sokoke. A total of 256 birds were mist-netted and ringed of which only five were Spotted Ground Thrushes, caught over four sessions.

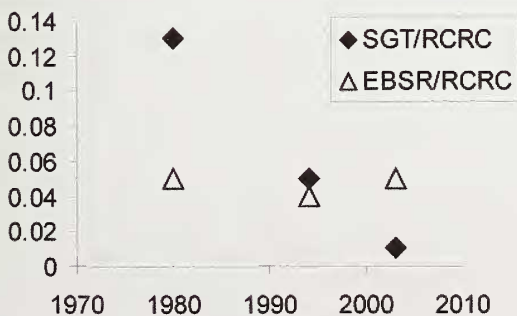
These data do not allow for proper calculation of the local population size of the species. We can only attempt to make predictions of population trends based on comparisons with past information. Here we use a comparison of the capture data in 2003 with that for Spotted Ground Thrush and two other ground-dwelling thrushes caught at Gede in 1983, 1986 (Bennun 1985, 1987), at five South Coast sites (Mrima Hill, Marenje, Kaya Gandini, Kaya Waa and Diani) in 1994 (Waiyaki 1995), and at two of the south coast forests

(Mrima Hill and Diani) in 1980 (Britton *et al.* 1980; Figure 2, Table 2). The proportions of captures at Gede in 1983 had remained virtually unchanged in 1986 (Bennun 1987) but had noticeably changed in 2003, with that of Spotted Ground Thrush relative to the other thrushes being approximately six times lower in 2003. Declines were also observed between 1980 and 1994 in the south coast sites. The proportion of Spotted Ground Thrush relative to the other thrushes in 1994 was approximately two times lower than in 1980, but declined at a higher magnitude between 1994 and 2003 to be four times lower. The proportion of the two other thrushes relative to each other, however, remained virtually unchanged over the two decades. The observed declines in proportions indicate an apparent continuing population decline of > 80% in the two decades for the Spotted Ground Thrush in the Kenyan coastal forests. These declines, however, appear to have been less severe in the 1980s but accelerated in the late 1990s.

Figure 2: Trends in proportions of Spotted Ground Thrush (SGT) over years in relation to two other forest thrushes: Eastern Bearded Scrub Robin (EBSR), an uncommon resident and the Red-capped Robin Chat (RCRC), a common intra-African migrant.



a) North coast forest
(Gede Ruins)



(b) South coast forests

Table 2: Totals and ratios of individuals caught for three ground-dwelling thrushes at Gede in 1983 and 1986 (Bennun 1987), at South Coast (Mrima Hill, Marenje, Kaya Gandini, Kaya Waa, Diani) in 1994 (Waiyaki 1995), at two of the south coast forests (Mrima Hill and Diani) in 1980 (Britton *et al.* 1980) and at both places in 2003.

Year		Gede Ruins			South Coast		
		1983	1986	2003	1980	1994	2003
Total	<i>Cossypha natalensis</i>	37	32	22	38	142	73
	<i>Cercotrichas quadrivirgata</i>	5	5	3	2	6	4
	<i>Zoothera guttata</i>	10	9	1	5	7	1
Ratio	<i>Z. guttata/C. natalensis</i>	0.27	0.28	0.05	0.13	0.05	0.01
	<i>Z. guttata/C. quadrivirgata</i>	2.00	1.80	0.33	2.50	1.17	0.25
	<i>C. quadrivirgata/C. natalensis</i>	0.14	0.16	0.14	0.05	0.04	0.05

The seven records of Spotted Ground Thrush during the survey were only detected by sight or capture. This greatly reduced its detection probability as compared to other forest birds, most of which were more often detected by hearing their calls. The mean probability of detecting other ground feeding thrushes (Red-capped Robin Chat, Eastern Bearded Scrub Robin and Red-tailed Ant Thrush) by sight was much lower (0.16) than by hearing (0.84). Assuming that failure to detect Spotted Ground Thrush by hearing similarly reduced its detection probability, then its non-vocal behaviour reduced an observer's chance of detecting the species during counts by at least six times. In correcting for the reduced detectability of the bird, these counts thus give a crude population density estimate of one Spotted Ground Thrush per every 2 to 3 ha of good forest. Population densities of the species in Gede have previously been estimated to be as high as one bird per 0.3 ha based on the 1983 and 1986 studies (Bennun 1992) suggesting a major decline. This apparent decline in population density between 1983 and 2003 is consistent with the estimated > 80% decline in the past two decades above. On the contrary, forest cover and habitat features in the key Kenyan Spotted Ground Thrush sites (e.g. Gede Ruins and Arabuko-Sokoke forests) have not deteriorated in the same magnitude. In fact they have remained virtually unchanged over the past two decades. On the other hand, there is no evidence of recent change in the Rondo Plateau Forest breeding grounds in Tanzania (Baker and Baker 2002).

Comparisons between past and recent casual observations in the study area are also indicative of declines in the population of the species in various Kenyan coastal forests. In the 1970s many observers routinely reported 3 - 5 birds at Gede Ruins forest on a morning walk, suggesting that it occurred at higher densities (Britton & Rathbun 1978). Similarly, the staff of Gede Ruins who are familiar with the species reported seeing them almost daily and even foraging around the offices up until c.1995-6 (Hilary Mwachira *pers. comm.*). In comparison, none were reported casually during our 120 man-hours of search in the forest, or during other routine visits made by local bird guides

and bird watchers between 1998 and 2002. Similar trends are also illustrated by apparent reduced chances of seeing the species in Diani forest over years during casual visits between 1975 and 1990 (Burrell & Abel 1976, Irvine & Irvine 1977a & b, 1991).

Habitat preference

A simple comparison of vegetation features between the plots where the Spotted Ground Thrush was caught or seen and other random plots where it was not recorded (Appendix 1) showed that the plots where the species was recorded were characterised by: less herbal or grass cover at the ground level; less shrub cover; a more closed canopy; lower canopy height; lower tree density; higher visibility below as evidenced by longer chequer board visibility distances and less evidence of human disturbance as indicated by cut stems and foot paths. All except one (Diani, Banana Farm) of the sample plots where Spotted Ground Thrush was recorded were not flat. This is despite the fact that 50 % of all the random plots that were assessed for slope ($n = 96$) were flat. This could probably imply preference for slanting ground.

Most indications are that the bird is exclusively a ground feeder. In all ($n = 7$) except one of the observations we made, it was feeding on the ground. Past documented observations are consistent with this behaviour. It has been seen on the ground feeding on ants from a leaf-strewn roadway (Burrell & Abel 1976) and exploring leaf debris on the forest floor (Irvine & Irvine 1988). Fanshawe (1994) notes that it may emerge onto the paths at first light together with Red-capped Robin Chat and Eastern Bearded Scrub Robin.

In Arabuko-Sokoke Forest, although we surveyed the species in both mixed and *Cynometra* forests, we only managed to locate it in the mixed forest. The mixed forest was in the past dominated by the valuable timber tree *Afzelia quanzensis*, but decades of commercial logging for the tree means that other tree species now dominate the main canopy (KIFCON 1995). Past information strongly indicate that Spotted Ground Thrush had higher preference for the *Afzelia* (now mixed) and *Cynometra* than *Brachystegia* forest. Visits to the forest by Britton & Zimmerman (1979) indicate that the bird was recorded at least three times, but on fewer than 50% of the visits in *Afzelia* and *Cynometra* forests. In *Brachystegia* it was recorded only once or twice. Bennun & Waiyaki (1991) noted that Spotted Ground Thrush had been recorded from all habitats in Arabuko-Sokoke Forest but were very scarce, and seemed to prefer denser, shadier forest in *Afzelia* or *Cynometra*, being only rarely recorded in more open *Brachystegia*.

Previously it was apparent that Spotted Ground Thrush probably occurred at higher densities in Gede Ruins forest than Arabuko-Sokoke Forest (Britton & Rathbun 1978; Bennun 1985, 1987). Britton & Rathbun (1978) attributed this to the possibility that the accumulated detritus from the prolonged occupation of the historical city in Gede over a period of about 300 years might have significantly improved the feeding opportunities for this species (and influenced the composition of the forest trees), or equally well it might

favour wetter areas. In addition, unlike the Arabuko-Sokoke Forest, Gede Ruins are on coral rag, and it may in fact have a preference for the uneven ground characteristic of coral rag forests. However, the apparent declines in Spotted Ground Thrush densities in Gede Ruins over the past decade despite insignificant changes in habitat structure make this explanation doubtful.

Generally, the habitat conditions in most of Arabuko-Sokoke, Gede Ruins, Mrima Hill and Diani forests seemed to match the ostensible preference for the Spotted Ground Thrush, while those in Kaya Diani, Kaya Waa, Marenje and Shimoni did not. Conditions in Kaya Gandini had deteriorated compared to past observations, and although recorded here, the bird may soon disappear from this site.

Existing conservation measures

Production of International and National Action Plans for Spotted Ground Thrush (Sande *et al.* 2003, Sande & Ndang'ang'a 2004) is the most significant measure for conservation of Spotted Ground Thrush in Kenya. National Spotted Ground Thrush Action Plans for Kenya and Tanzania have been proposed and if implemented, will substantially benefit the conservation of East African Spotted Ground Thrush populations. Most of the proposed actions contained in these plans are, however, yet to be implemented due to lack of resources.

There are several other site-based conservation actions in place that may benefit the Spotted Ground Thrush. A strategic management plan for conservation of Arabuko-Sokoke forest now exists (ASFMT 2002). If implemented, this plan will be quite valuable for conservation of a significant area of the habitat. Arabuko-Sokoke Forest also benefits thrush's from conservation through an extremely successful butterfly-rearing project (KIPEPEO project) developed by Nature Kenya and National Museums of Kenya. The project has helped increase community revenue from non-timber forest products and now operates profitably.

Apart from a few, most of the sites where the species can be found have some form of protection offered by Kenya Wildlife Service (KWS), Forest Department or National Museums of Kenya (NMK). In some instances, e.g. Gede Ruins, this protection has retained the forest habitat in suitable condition for the species, while in others human disturbance, although controlled, has continued to degrade the species' habitat, e.g. in Kaya Gandini and Mrima Hill. Since some of the national monuments are mostly conserved for their cultural and historical values some actions, e.g. clearing of under growth in Gede and creation of tourist trails, may not always be compatible with the conservation of Spotted Ground Thrush habitat. In addition all the sites where the species has been confirmed to exist in Kenya are recognised as Important Bird Areas (IBAs) and are to benefit from conservation actions scheduled under the IBA programme. These include the ongoing Darwin Initiative-funded Monitoring programme.

Recommendations

- Implementation of the already drawn Action plans for the species.
- Detailed surveys of the species at its breeding and non-breeding grounds in Tanzania, and if possible Mozambique, should be done to test whether the apparent population decline in Kenya could be related to changes in conditions outside Kenyan sites.
- More ringing of birds should be done in Kenyan and Tanzanian sites to increase the chances of recoveries that can provide information on movement patterns and possible causes of mortality.

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Appendix 1. Vegetation assessment in all visited forests, the points where *Z.g. fischeri* was recorded (SGT points), and where it was not recorded (non-SGT points).

	All	ASF (Cynometra)	ASF (mixed)	Diani	Gede Ruins	Kaya Diani	Kaya Gandini	Kaya Waa	Marenje	Mirima Hill	SGT points	non-SGT points	
Canopy Ht (m)	N	171	8	13	16	25	18	29	5	16	41.0	7	164
	Mean	10.5	6.1	10.1	10.2	8.2	10.4	9.9	8.2	8.9	14.5	8.8	10.6
	Sd	4.2	1.1	2.1	4.1	2.0	3.8	2.8	0.7	1.8	5.2	2.5	4.3
No. of trees (>3 m ht)	N	162	8	13	16	23	17	29	5	17	34	6	156
	Mean	18.0	29.5	24.2	21.4	13.8	26.4	14.3	14.0	17.1	14.2	17.2	18.1
	Sd	11.3	13.5	16.5	5.9	9.7	20.1	7.1	4.2	5.9	4.7	7.1	11.5
No. of cut stems	N	164	8	13	16	25	18	26	5	17	36	6	158
	Mean	3.5	2.0	0.2	1.9	1.4	5.4	5.9	0.6	8.0	2.6	1.8	3.5
	Sd	7.7	2.6	0.6	2.1	2.1	18.7	6.1	1.3	9.1	3.0	2.6	7.8
% herb/grass cover (0-1 m)	N	168	8	12	16	23	18	29	5	17	40	6	162
	Mean	27.4	13.4	37.1	10.1	37.8	26.7	15.9	36.0	42.1	29.6	10.8	28.0
	Sd	23.8	15.2	20.7	17.9	29.6	23.2	13.4	20.7	28.5	21.2	10.2	24.0
% cover of shrubs (1-3 m)	N	135	8	13	16	17	14	28		15	24.0	6	129
	Mean	49.0	54.4	55.8	44.1	37.1	31.4	48.0		65.0	56.5	41.7	49.3
	Sd	25.5	21.1	24.5	21.8	24.6	27.9	28.3		22.2	18.6	27.9	25.4
% cover of low trees (3-8 m)	N	170	8	13	16	23	18	29	5	17	41	7	163
	Mean	59.1	75.0	73.5	68.4	55.2	55.3	56.4	60.0	57.6	54.0	68.6	58.7
	Sd	21.1	11.3	12.8	17.6	23.8	23.7	19.0	9.4	24.1	21.2	19.5	21.1
% cover of high trees (>8 m)	N	135	8	13	16	17	14	28		15	24.0	6	129
	Mean	34.8	9.4	46.9	31.3	39.1	42.5	34.6		24.7	37.9	41.7	34.5
	Sd	23.3	9.8	22.1	26.4	25.1	28.3	21.6		14.2	20.5	28.6	23.1
% canopy cover	N	171	8	13	16	25	19	29	5	17	39	7	164
	Mean	68.3	64.2	70.1	81.5	65.7	80.3	58.8	70.3	55.7	71.4	78.9	67.9
	Sd	16.1	13.4	8.5	10.9	12.3	9.3	20.4	4.9	19.7	11.8	10.9	16.1
Board distance (visibility)	N	139	8	13	15	25	13	27		15	23.0	5	134
	Mean	4.9	4.1	5.0	5.9	5.9	4.5	4.4		4.1	4.7	5.5	4.9
	Sd	1.7	1.0	1.3	1.8	1.4	1.5	2.0		1.7	1.5	1.8	1.7